



Transforming US Defense R&D to Meet 21st Century Challenges

NDIA 11th Annual Science and Engineering Technology Conference

13 April 2010

**The Honorable Zachary J. Lemnios
Director, Defense Research and Engineering**



New Coordinates



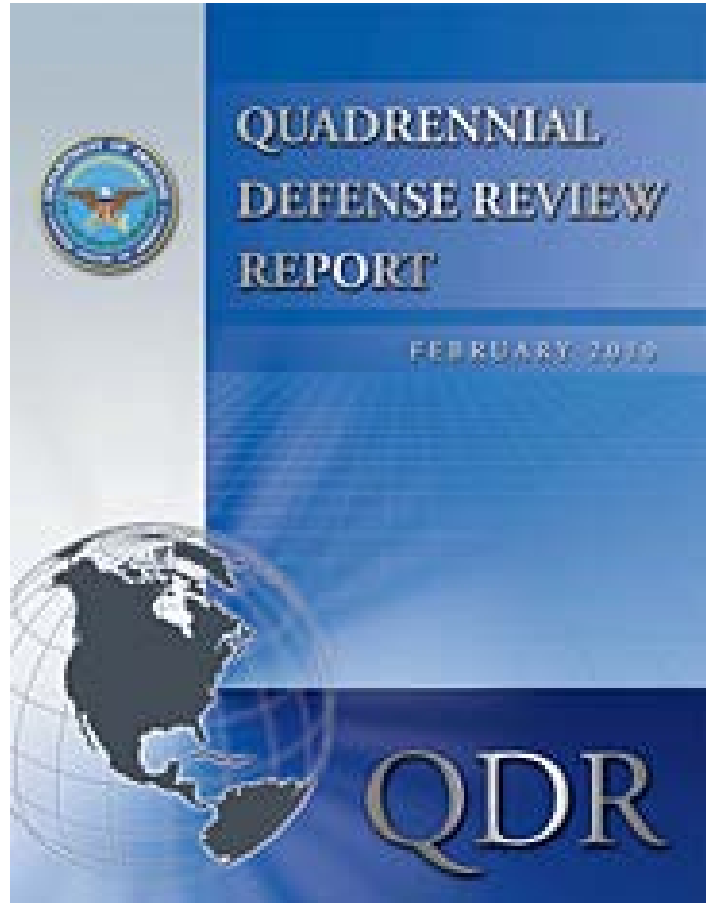
Innovation

Speed

Agility



2010 Quadrennial Defense Review



1. Take care of our people
2. Rebalancing the Military
3. Reforming what and how we buy
4. Supporting our troops in the field





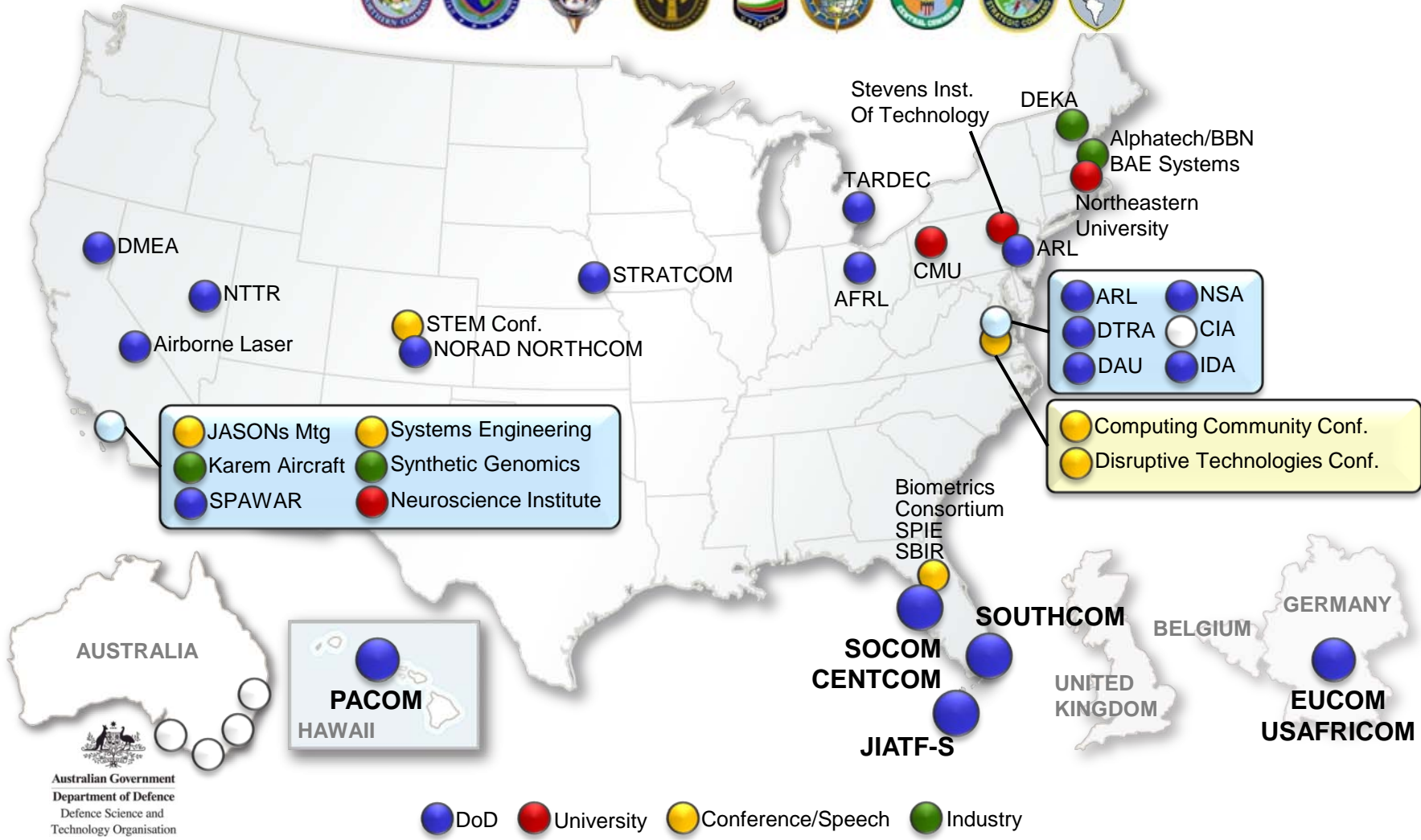
DDR&E Imperatives



- 1. Accelerate delivery of technical capabilities to win the current fight.**
- 2. Prepare for an uncertain future.**
- 3. Reduce the cost, acquisition time and risk of our major defense acquisition programs.**
- 4. Develop world class science, technology, engineering, and mathematics capabilities for the DoD and the Nation.**



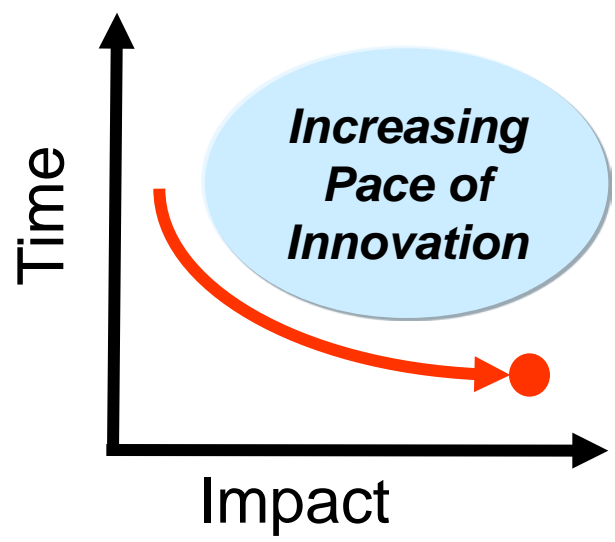
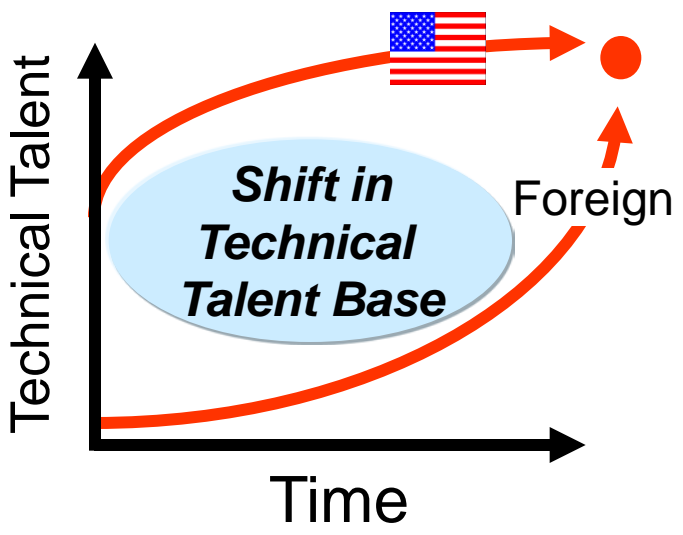
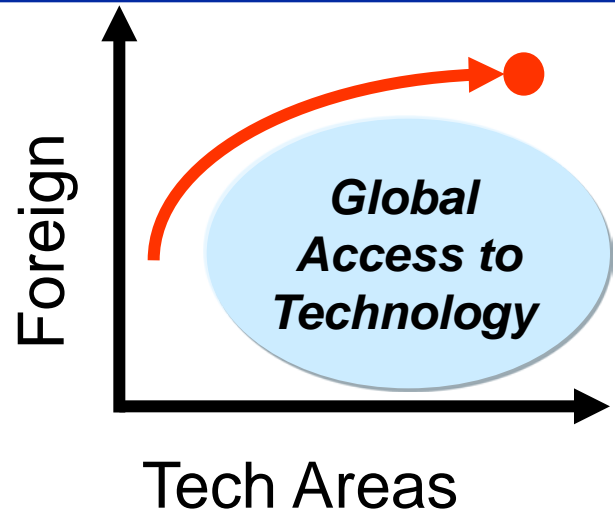
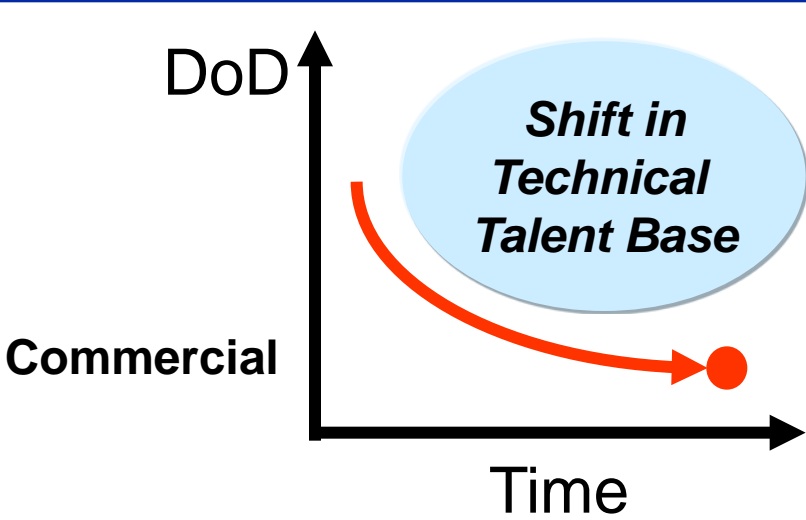
COCOM Engagement



Australian Government
 Department of Defence
 Defence Science and
 Technology Organisation

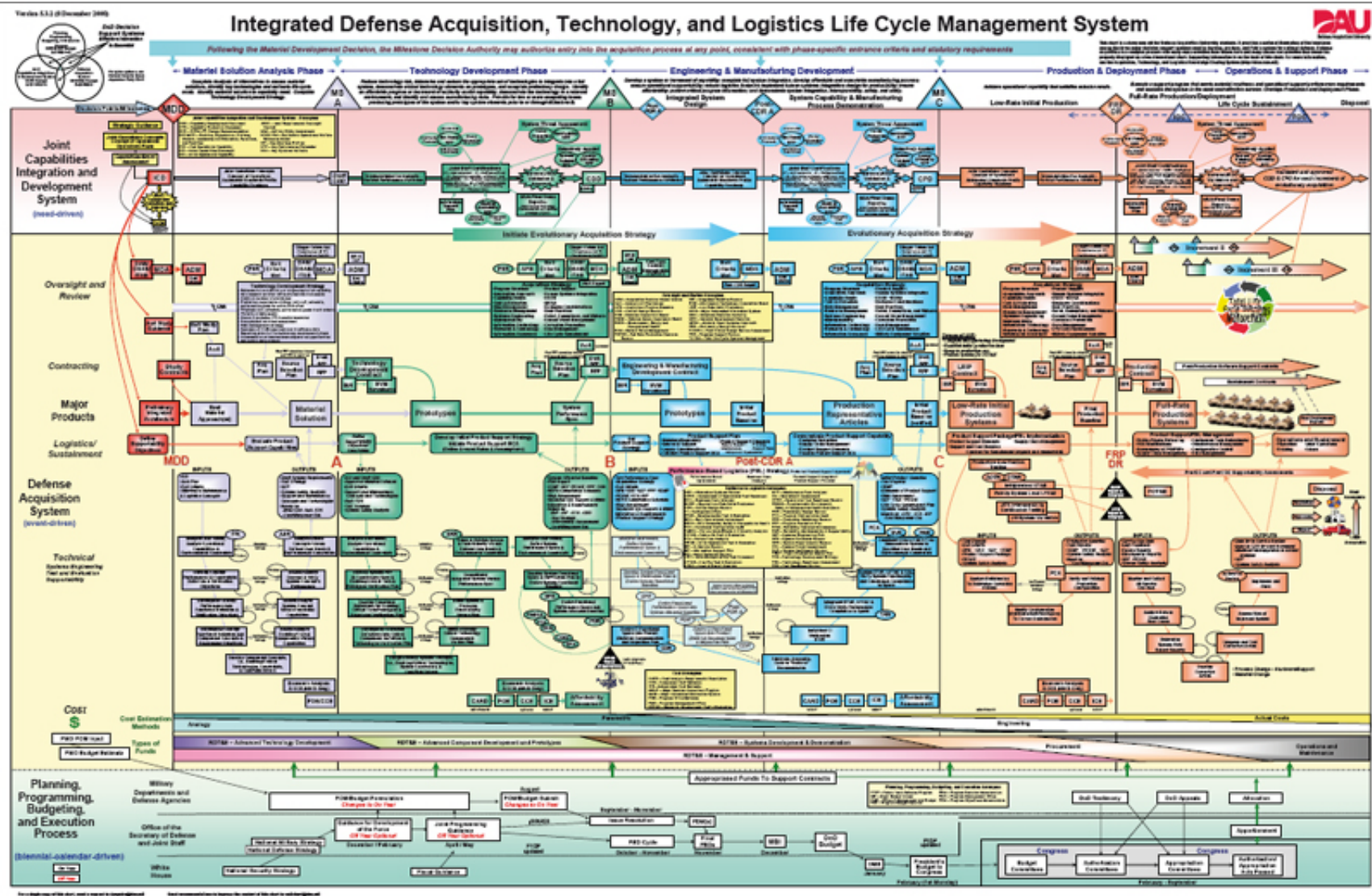


Key Challenges to our Technical Base





The DoD 5000.02 Process

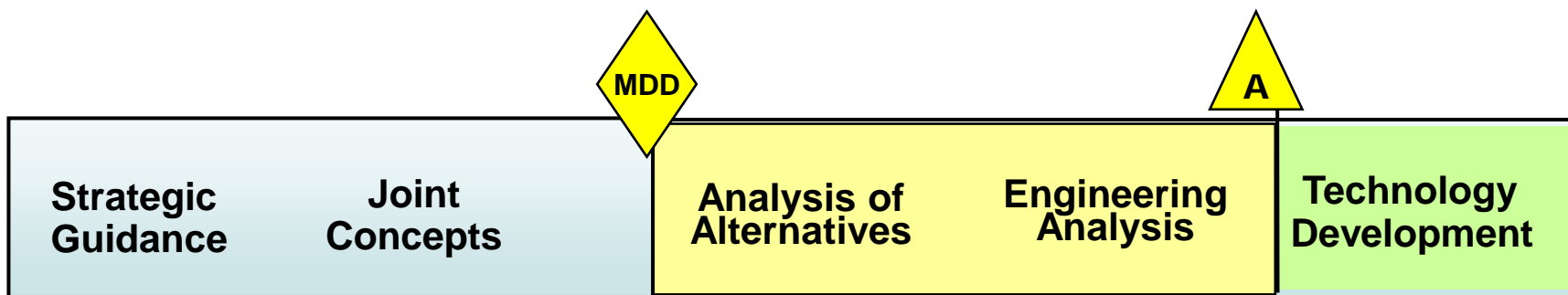




The New Approach of Development Planning



- **WSARA directed**
 - **Spans entire lifecycle**
 - **Technical leadership**
 - **System of systems architectures**
 - **Assess multiple robust, material options**
 - **Identify material solution with well understood and quantified risk**

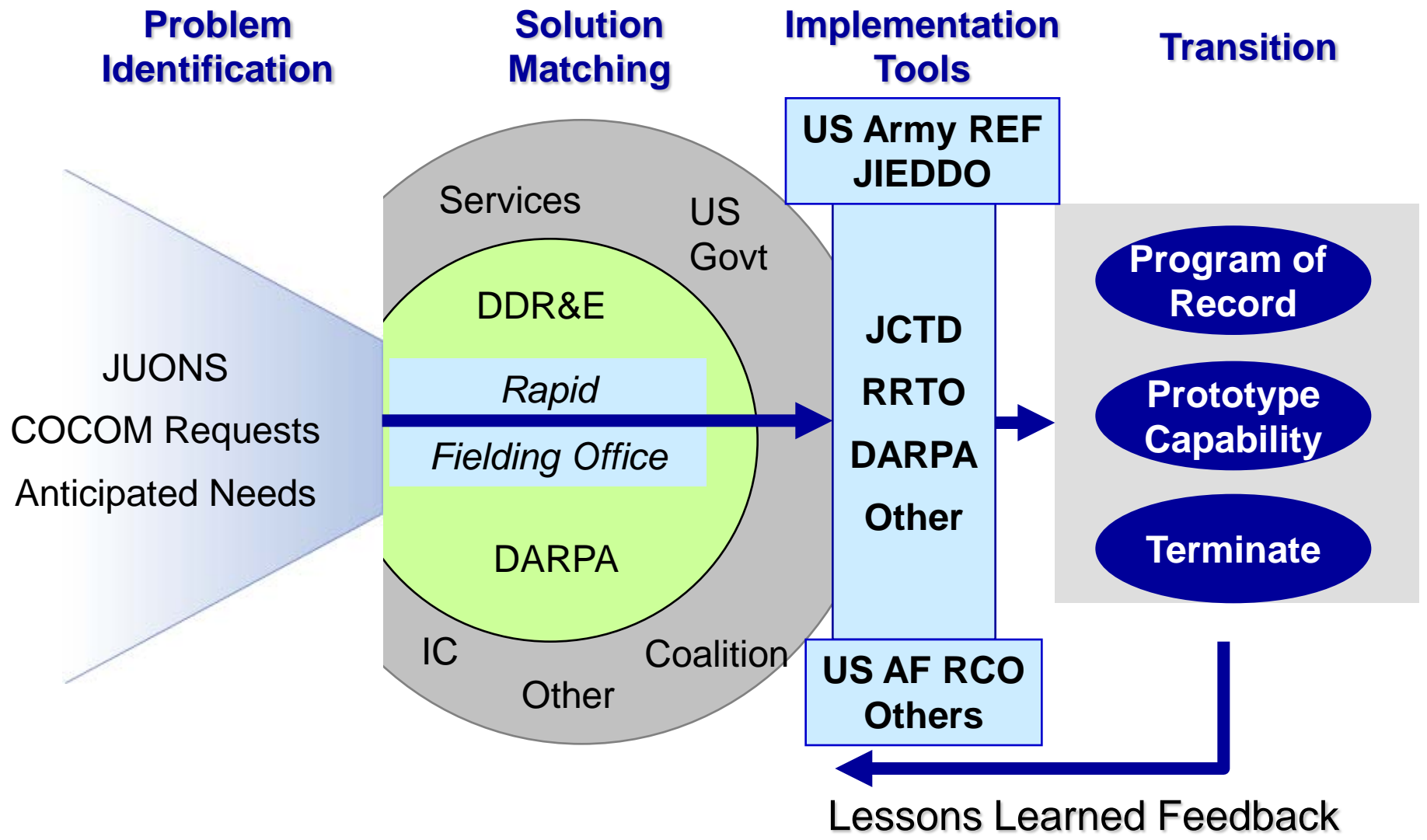


Development Planning





DDR&E Approach to Rapid Fielding



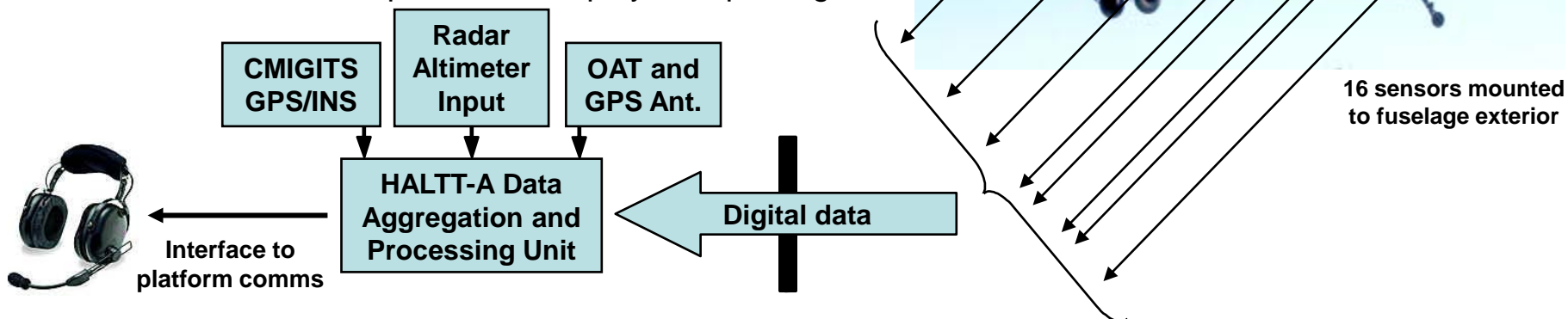


Helicopter Survivability Task Force Technologies



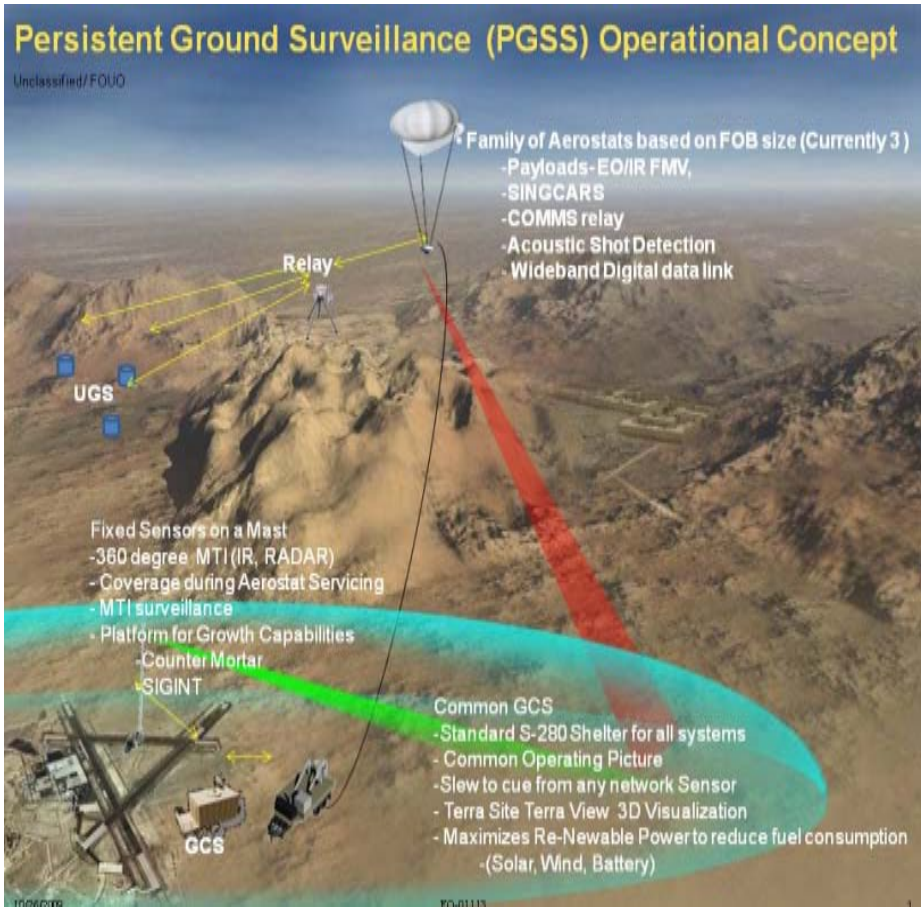
- **Technology:** Helicopter ALert & Threat Termination–Acoustic (HALTT-A)
 - Acoustically detect incoming bullets & localize shooter(s)
- **DDR&E Effort:** Rapid Insertion Initiative transitions up to 5 systems to OEF
- **Rapid Insertion Initiative Status:**

- 10/01/09: Award contract
- 12/01/09: Begin integration
- 01/22/10: Begin ground functionality testing
- 02/08/10: Begin single-ship live fire testing
- 03/08/10: Begin multi-ship live fire testing
- 03/18/10: Complete data reduction
- 03/31/10: Develop details of deployment package





Persistent Ground Surveillance System



- Integrated ISR, comm relay
- Acoustic shot detection
- Idea refined via JCTD program, rapidly fielded (~12 months)
- Currently overhead FOB in Afghanistan
- 20+ more inbound to theater



Joint Experimental Range Complex



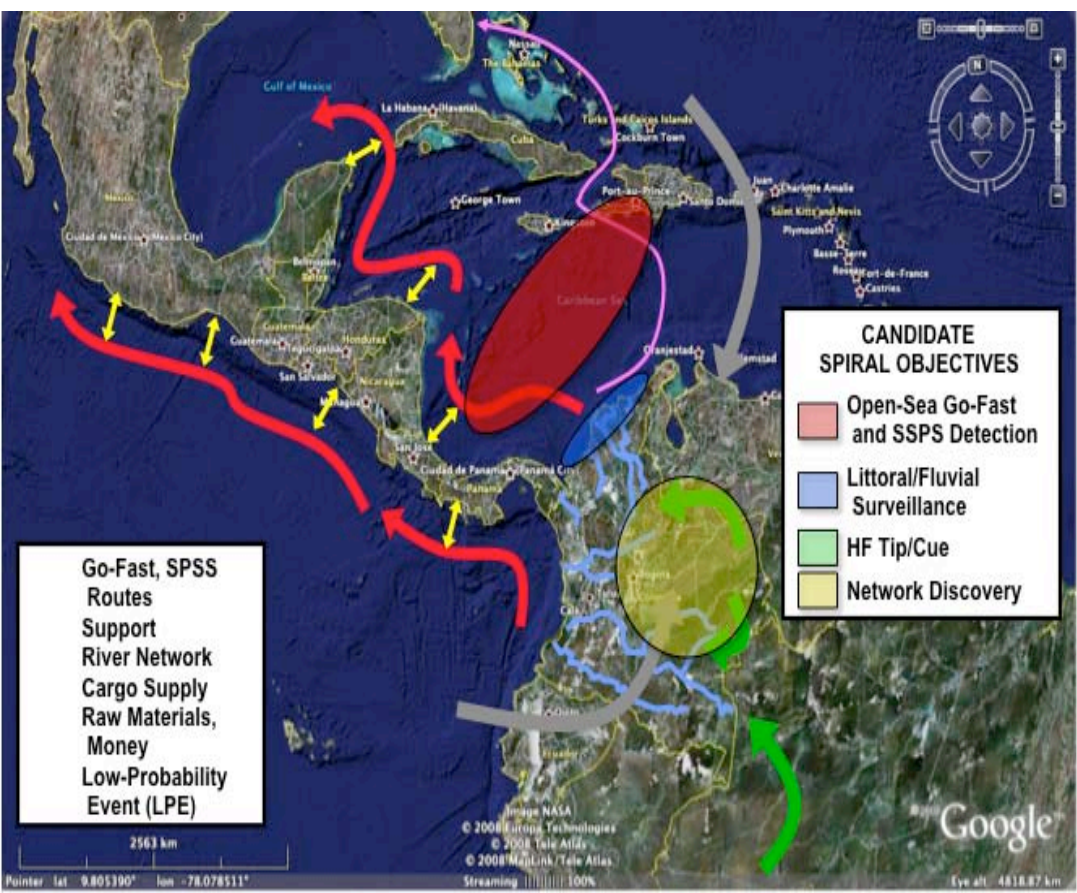
CAPABILITIES

- Over 9 miles of improved and unimproved roadway
- 50/60-Hz overhead power
- Surveyed buried munitions array
- Over 70 buildings
- Significant urban features
- “Rolling hill” terrain features

- Extensive EME Capabilities
- Advanced Comms Networks



Thunderstorm Data Collect

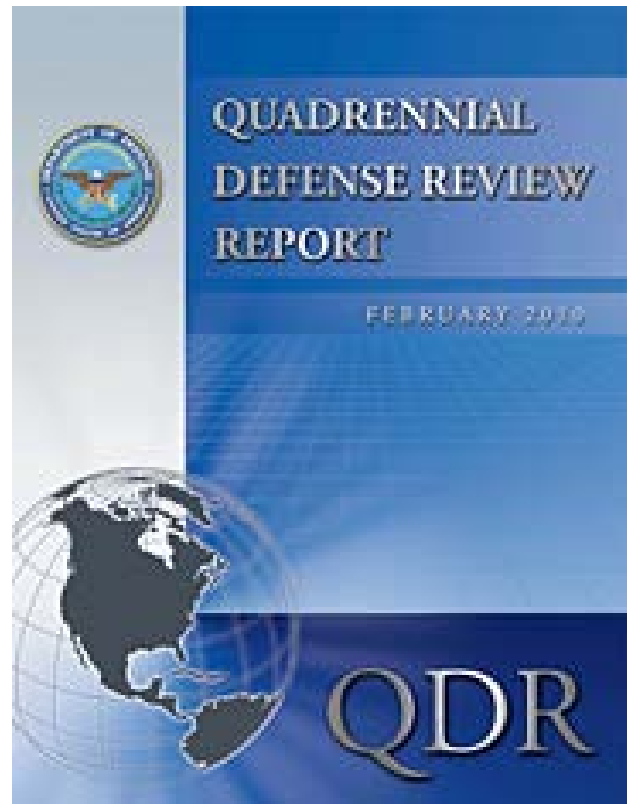


- Persistent maritime ISR
- Semi-submersibles
- Multi-int data fusion
- Large data set handling
- **COCOM-support, primarily SOUTHCOM scenario / real world support**

Data-to-decisions



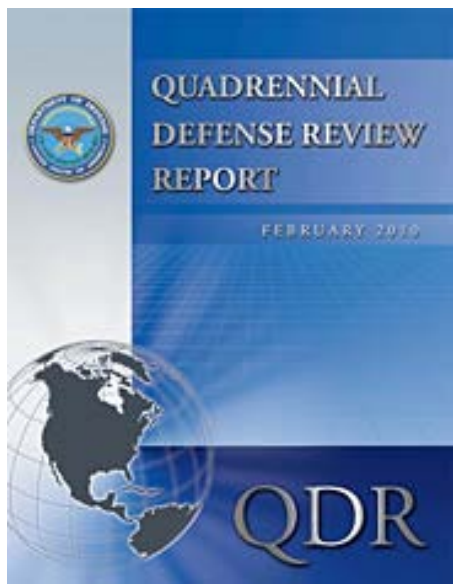
QDR Mission Areas



- 1. Defend the United States and Support Civil Authorities at Home**
- 2. Succeed in Counterinsurgency, Stability, and Counterterrorism Operations**
- 3. Build the Security Capacity of Partner States**
- 4. Deter and Defeat Aggression in Anti-Access Environments**
- 5. Prevent Proliferation and Counter Weapons of Mass Destruction**
- 6. Operate Effectively in Cyberspace**



Landscape for Six Quick Look QDR Studies



Objective Architectures (Mission 1-6)

Critical Capabilities

Enabling Technologies

Defense Laboratory Base

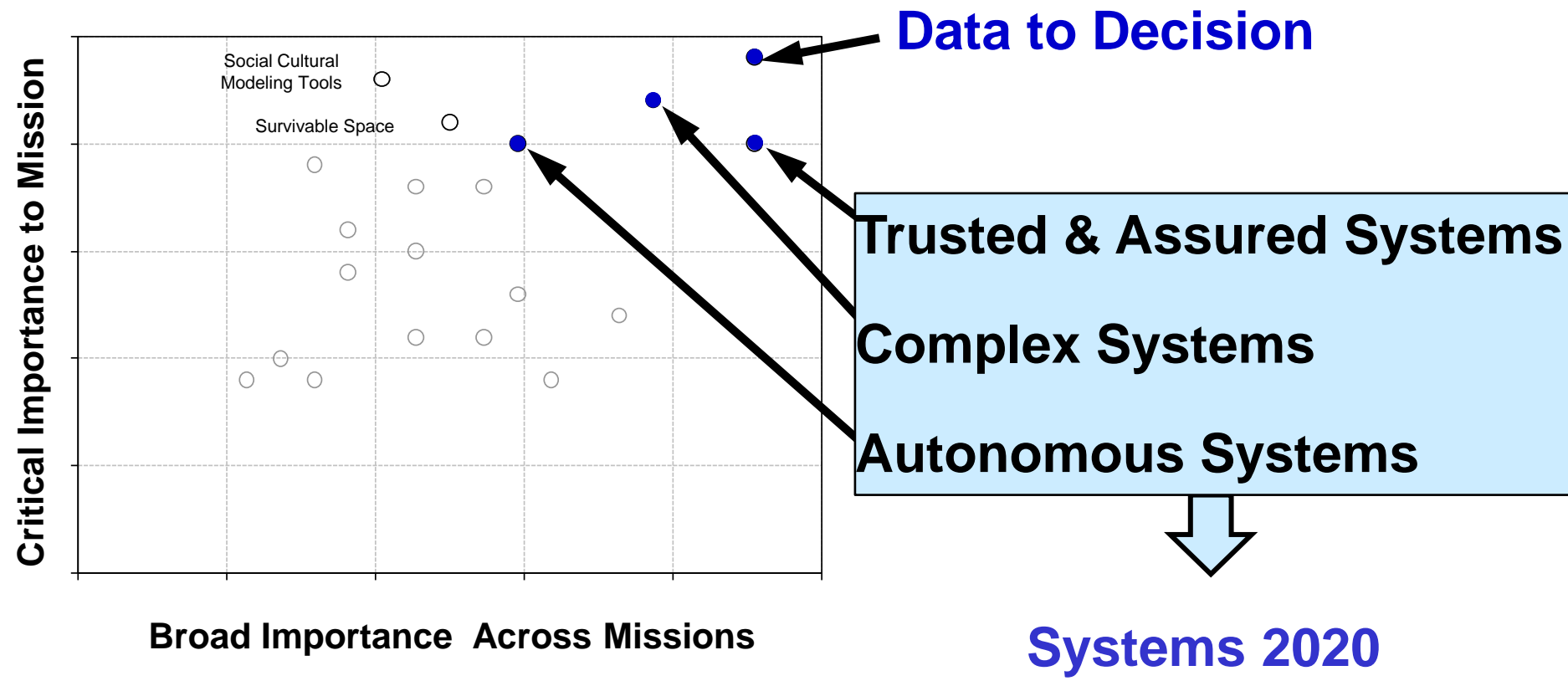
Industrial Tech Base

POM-12 Initiative





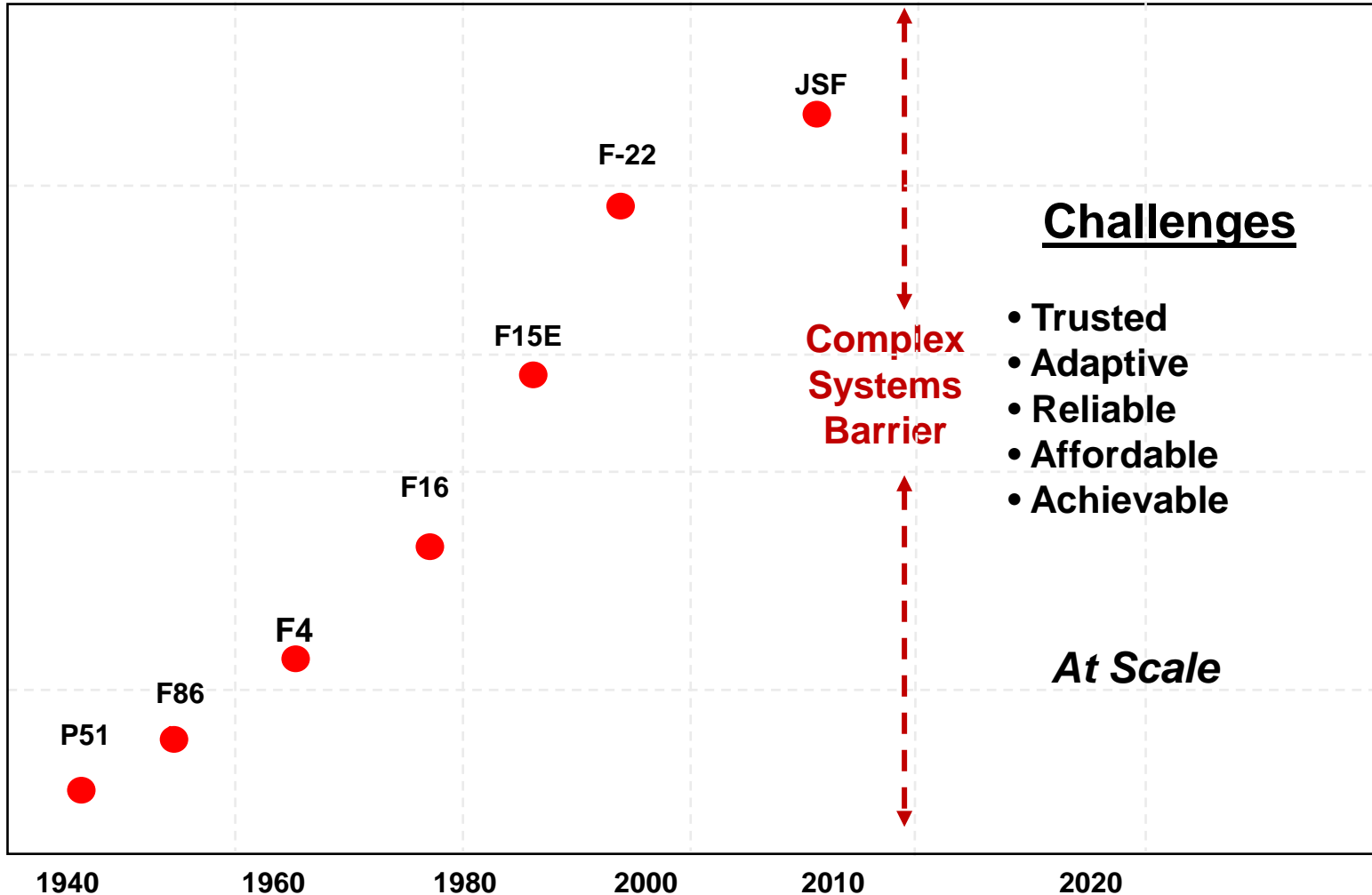
Focused DDR&E Initiatives





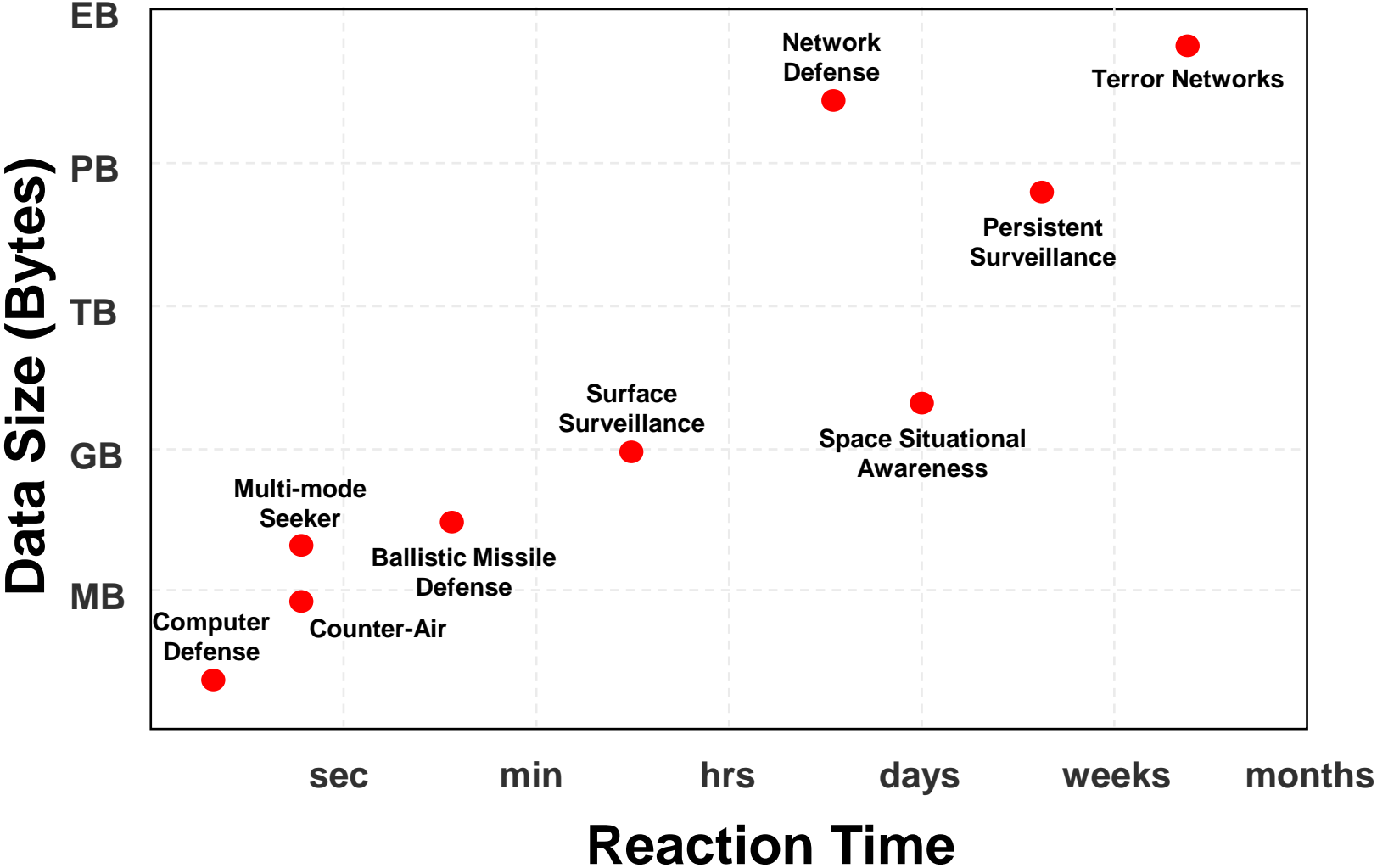
Complex Systems Challenge

Complexity





The Growth in Data Volume

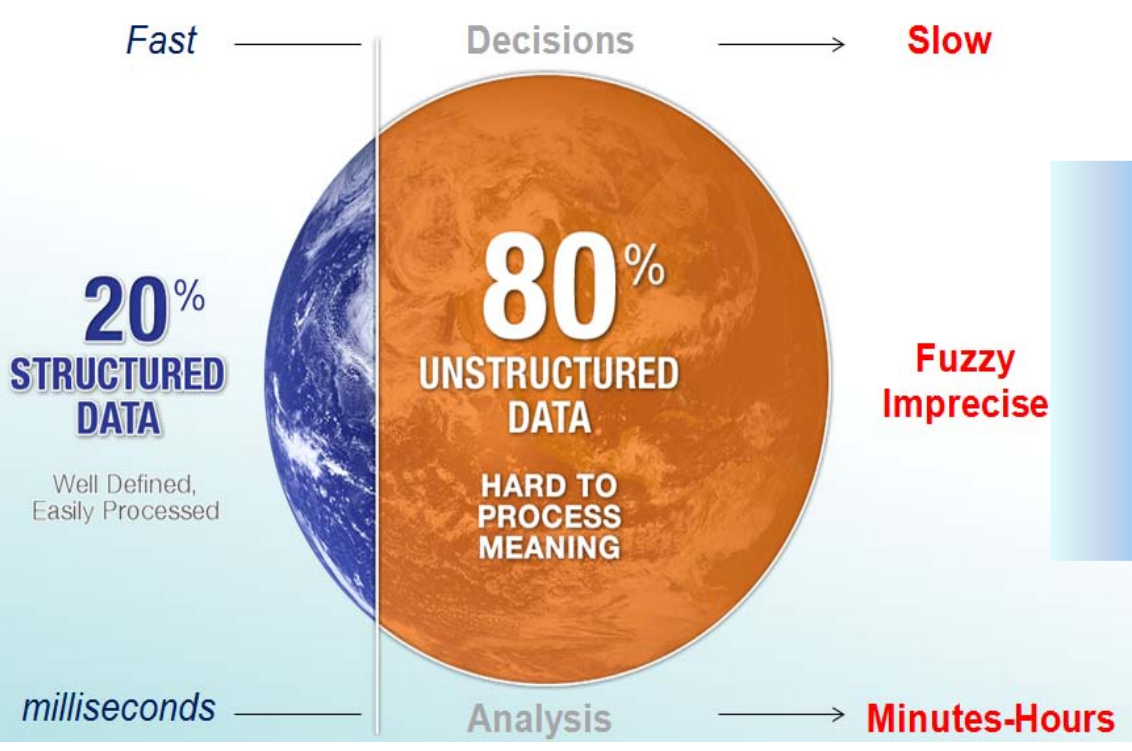


New challenge: extremely large data volumes and advanced analytic tools



Data to Decisions

Most is Unstructured and Hard to Extract Meaning, Patterns, Trends
The *Real Time* Web Makes This Even Harder



- ## RESEARCH AREAS
- Information Management
 - Data Structure
 - Architecture
 - Analytic Tools
 - Human-Machine Interface

Source: TTI Vanguard Conference - Psydex



Systems 2020

Complex System Design

Complex Systems Manufacturing

Trust & Assurance

- **Common design libraries**
- **System of System simulation, analysis and synthesis**
- **Manage complexity**

- **Networked design and manufacturing**
- **Agile, reconfigurable production methods**
- **Life cycle conscious**

- **Streamlined certification**
- **Effective authentication**



DDR&E Thought Leadership



Man's mind, once stretched by a
new idea, never regains it's
original dimensions.

Oliver Wendell Holmes
US author & physician (1809 - 1894)

Innovation - Speed – Agility